

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

Applicant: Fufang Zha et al.  
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Title: MIXING CHAMBER  
Examiner: Menon, Krishnan S.  
Art Unit: 1797

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**CERTIFICATE OF TRANSMISSION UNDER 37 C.F.R. § 1.8(a)**

The undersigned hereby certifies that this document is being electronically filed in accordance with § 1.6(a)(4), on the 28th day of October, 2010.

/Gregory Gerstenzang/  
Gregory Gerstenzang, Reg. No. 59,513

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Commissioner for Patents

**RESPONSE TO NOTIFICATION OF NON-COMPLIANT  
APPEAL BRIEF UNDER 37 C.F.R. § 41.37**

Dear Sir:

Pursuant to MPEP § 1205.03, this paper is filed in response to the Notification of Non-Compliant Appeal Brief mailed on October 15, 2010. Section V of the Appeal Brief originally filed on October 6, 2010 is modified herein to include subheadings identifying the independent claims summarized.

No fee is believed to be required for the filing of this appeal brief amendment.

**V. SUMMARY OF CLAIMED SUBJECT MATTER (37 C.F.R. § 41.37(c)(1)(v))**

Aspects and examples of the claimed subject matter are generally directed to apparatus for filtering liquid.

**A. Claim 1**

In one example, a membrane filtration apparatus is claimed. The apparatus generally includes a plurality of membrane filtration modules, each membrane filtration module comprising a plurality of porous membranes extending in an array, said plurality of porous membranes encased in a support structure and having lower ends mounted in a lower pot supported by a lower header and upper ends mounted in an upper pot supported by an upper header, said upper header configured to provide for permeate to be withdrawn from said upper ends of said plurality of porous membranes, and a plurality of distribution apertures defined in said lower pot, said distribution apertures configured to distribute a scrubbing fluid into said module and along a surface or surfaces of said membranes. The apparatus further includes a single manifold coupled to said lower header of each of said plurality of membrane filtration modules and a single chamber positioned below, and connected to, said manifold, said chamber constructed and arranged to promote upward flow of feed liquid therethrough. The chamber comprises an open base end in fluid communication with a source of feed liquid, a second end in fluid communication with said distribution apertures, and a single gas inlet constructed and arranged to introduce gas into said chamber in a downward direction from above the open base end, said gas fed from above and through said manifold and into said chamber, said gas inlet centered between at least two of said plurality of membrane filtration modules and configured to release gas into said chamber at a position vertically displaced below said at least two of said plurality of membrane filtration modules. The chamber is configured to mix gas and liquid to produce said scrubbing fluid and further configured to distribute said scrubbing fluid to said distribution apertures. (See Applicants' specification as originally filed at page 3, lines 3 – 21, page 7, lines 5 – 17, page 4, lines 17 – 23, page 12, line 8 – page 13, line 5, and FIG. 2.)

**B. Claim 12**

In another example, an assembly of membrane modules is claimed. The assembly of membrane modules generally includes a plurality of porous membranes extending in an array and having lower ends mounted in a plurality of lower pots supported by a plurality of respective lower headers, and upper ends mounted in a plurality of upper pots supported by a plurality of

respective upper headers, said lower pots being configured to provide a number of distribution apertures therein for distributing a scrubbing fluid into said assembly of membrane modules and along a surface or surfaces of said membranes, said lower headers coupled to a manifold and a chamber positioned below and connected to said manifold, said chamber constructed and arranged to promote upward flow of feed liquid therethrough. The chamber comprises an open base end in fluid communication with a source of feed liquid, a second end in fluid communication with said distribution apertures, and a gas inlet constructed and arranged to introduce gas into said chamber in a downward direction from above the open base end, said gas fed from above and through said manifold. The chamber is configured to mix gas and liquid to produce said scrubbing fluid and further configured to distribute said scrubbing fluid to said distribution apertures. (See Applicants' specification as originally filed at page 3, lines 3 – 21, page 4, lines 17 – 23, page 7, lines 5 – 17, page 12, line 8 – page 13, line 5, and FIG. 2.)

### **C. Claim 35**

In another example, a membrane filtration apparatus is claimed. The membrane filtration apparatus generally includes a plurality of membrane filtration modules, each membrane filtration module comprising a plurality of porous membranes, said membranes being arranged in close proximity to one another and having lower ends mounted in a lower pot supported by a lower header and upper ends mounted in an upper pot supported by an upper header, said upper header configured to provide for permeate to be withdrawn from said upper ends of said porous membranes, a manifold coupled to said lower headers, an open-ended mixing chamber constructed and arranged to provide a cleaning mixture by mixing together liquid and gas bubbles, said chamber immersed in a feed tank and having an open base in fluid communication with a source of feed liquid, said chamber constructed and arranged to promote upward flow of feed liquid therethrough, a gas source positioned within the open-ended mixing chamber, the gas source constructed and arranged to introduce gas through a single gas inlet into the open-ended mixing chamber in a downward direction from above the open base, said gas fed from above and through said manifold and into said chamber, said single gas inlet centered within said plurality of membrane modules, and means for flowing said cleaning mixture along a surface of said membranes to dislodge fouling materials therefrom. (See Applicants' specification as originally filed at page 3, lines 3 – 21, page 4, lines 17 – 23, page 7, lines 5 – 17, page 12, line 8 – page 13, line 5, and FIG. 2.)

**D. Claim 40**

In another example, a membrane bioreactor is claimed. The membrane bioreactor generally includes a plurality of membrane filtration modules, each membrane filtration module comprising a plurality of porous hollow membrane fibres extending longitudinally between and mounted between an upper and a lower potting head, said membrane fibres being arranged in close proximity to one another, said fibres being partitioned into a number of bundles at least at or adjacent to their respective potting head so as to form a space therebetween, a header in which the lower potting head is supported, a manifold coupled to the header, an open-ended mixing chamber positioned below the lower potting head, said chamber constructed and arranged to promote upward flow of feed liquid therethrough, said chamber having an open base in fluid communication with a source of feed liquid, and a gas inlet positioned within the open-ended mixing chamber, the gas inlet spaced from and surrounded by side walls of the open-ended mixing chamber and configured to feed gas into the open-ended mixing chamber from above and through said manifold. At least one of said potting heads includes an array of openings formed therein in fluid communication with said chamber constructed and arranged to provide gas bubbles within said module such that, in use, said bubbles move past the surfaces of said membrane fibres to dislodge fouling materials therefrom. (See Applicants' specification as originally filed at page 3, lines 3 – 21, page 4, lines 17 – 23, page 7, lines 5 – 17, page 8, line 10 – page 9, line 4, page 12, line 8 – page 13, line 5, and FIG. 2.)

**E. Claim 41**

In another example, an assembly of membrane modules for use in a membrane bioreactor is claimed. The assembly of membrane modules generally includes a plurality of porous hollow membrane fibres extending longitudinally between and mounted between an upper and a lower potting head, said membrane fibres being arranged in close proximity to one another, said fibres being partitioned into a number of bundles at least at or adjacent to their respective potting head so as to form a space therebetween, a header in which the lower potting head is supported, a manifold coupled to the header, an open-ended mixing chamber positioned below the lower potting head, said chamber constructed and arranged to promote upward flow of feed liquid therethrough, said chamber having an open base in fluid communication with a source of feed liquid, and a gas inlet positioned within the open-ended mixing chamber, the gas inlet spaced from and surrounded by side walls of the open-ended mixing chamber, and centrally located

within the open-ended mixing chamber and configured to feed gas into the open-ended mixing chamber from above and through said manifold. The potting heads are configured to provide a number of distribution apertures therebetween in fluid communication with said chamber for providing gas bubbles within said assembly of membrane modules such that, in use, said bubbles move past the surfaces of said membrane fibres to dislodge fouling materials therefrom. (See Applicants' specification as originally filed at page 3, lines 3 – 21, page 4, lines 17 – 23, page 7, lines 5 – 17, page 8, line 10 – page 9, line 4, page 12, line 8 – page 13, line 5, and FIG. 2.)

Respectfully submitted,  
*Fufang Zha et al., Applicants*

By: /Gregory Gerstenzang/  
Gregory Gerstenzang, Reg. No. 59,513  
Peter C. Lando, Reg. No. 34,654  
LANDO & ANASTASI, LLP  
One Main Street  
Cambridge, Massachusetts 02142  
United States of America  
Telephone: 617-395-7000  
Facsimile: 617-395-7070

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